

Comments on the relevance of JP 2(1990)-259968 A
with respect to the invention of the present application

Regarding JP 2(1990)-259968 A, as portions that may be generally related to the invention of the present application, the following were translated: page 6, lower right column, line 10 - page 7, upper right column, line 17; page 15, lower right column, line 20 - page 18, lower right column, line 5; page 20, lower left column, line 18 - page 24, upper left column, line 20; page 47, upper left column, line 11 - page 52, lower right column, line 7; and page 55, upper right column, line 20 - page 63, upper right column, line 9.

In these portions, the following is disclosed.

- A plurality of settings can be collected in one soft button on a screen.
- When the soft button in which a plurality of settings are collected is operated, a pop-up screen is opened, and a plurality of settings are displayed in a pop-up screen, whereby any one of the displayed settings can be selected.

JP 2(1990)-259968 A also includes other passages generally related to the invention of the present application other than the above-mentioned translated portions; however, these passages merely disclose the same technique as that in the above-mentioned translated portions. Therefore, the translation of these passages was omitted to reduce translation costs.

The invention of the present application is different from the technique disclosed by JP 2(1990)-259968 A in terms of the assignability of a plurality of setting values to a mechanical operation member. Applicant believes that the passages that have not been translated in JP 2(1990)-259968 A are not relevant to this point. The Examiner is invited to contact the undersigned if there are questions at this time.

Partial Translation of JP 1990-259968

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From the tenth line of lower right column on page 6 to the seventeenth line of upper right column on page 7

[d] Improvement in maneuverability

Maneuverability is improved by using hard buttons in a hard control panel and soft buttons on a CRT screen soft panel together, achieving user-friendliness for beginners and freedom from nuisance for experts, enabling direct selection of function contents, and concentrating operations to one place as much as possible, and at the same time, by effectively using colors, information necessary for an operator is accurately conveyed. HIFI copy is carried out only by the operation of the hard control panel and basic screen, and start, stop, all clear, interrupt, etc. which cannot be defined by the operation flow are carried out by operation of hard buttons, and paper selection, reduction and magnification, copy concentration, image quality adjustment, color mode, color balance adjustment, and others are performed by the basic screen soft panel operation so that conventional single-color copying machine users can make full use of it without any trouble. Furthermore, various kinds of editing functions, etc. can be used only by

touch-operating pathway tabs in the pathway region of the soft panel and various kinds of editing functions can be chosen only by opening the pathway. Furthermore, by storing a copy mode and its execution conditions, etc. in a memory card in advance enables automation of the specified operations.

[e] Completion of functions

The present invention is primarily characterized in that in the user interface, as described above, displays of selection of functions, selection of execution conditions, and other menus are carried out by display units such as CRTs, etc. so that anyone can easily operate the copying machine, and at the same time, all the operations of copying work from inlet to outlet of the machine are fully automated while a wide variety of functions that respond to user needs are incorporated.

As the major functions, by the operation of the hard control panel, start, stop, all clear, ten-keys, interrupt, information, language change-over, etc. which are unable to be defined by the operation flow are carried out, and various functions can be chosen by touch-operating soft buttons on the basic screen. In addition, by touching the pathway tabs that corresponds to the pathway which is a function selection region, the pathway is opened to enable selection of marker edition, business edition, creative edition, and other various editing functions, and by simple operations which can be used by conventional copying sensation, full-color and black/white copying can be conducted. Furthermore, the area designated by the editing function is displayed by the bit-map area and the designated area can be confirmed. In this way, with abundant editing functions and color creations, power of text expression can be remarkably improved.

From the twentieth line of lower right column on page 15 to the fifth line of lower right column on page 18

(II) User interface (UI)

(II-1) Adoption of color CRT display and optical touch board

As has been described, the present copying machine is a high-performance digital color copier that can carry out black and white copying, not to mention four-full-color, three-color, and other color copying, is equipped with various editing functions and at the same time enables fully automated operation. Consequently, the digital color copier can be suitably used not only when so-called beginners who are not so much familiar with the functions or configuration of the copying machine hope to simply make a required number of photocopies of black and white documents but also when so-called skilled experts such as designers who frequently utilize copiers create fresh and ingenious documents making the best of various editing functions.

Now, this is not particular about the present copier but in using all copiers, copy execution conditions (copy mode) must be set and necessary parameters must be set in accordance with what kind of copies should be made. It is the UI that stands between the user and the copier in setting these and supports communication between them.

Consequently, in the UI, the maneuverability becomes an extremely important point. That is, copiers which are equipped with various functions and provide high reliability will enjoy high reputation as copiers by themselves, but if these functions are difficult to use, how much unrivalled functions are equipped, the value as copiers will be extremely degraded and

the copiers become merely expensive things, and comprehensive rating would be greatly decreased. In particular, in copiers which have such a lot of editing functions as is the case of the present copier, many operations are required to select functions and set parameters, and mistakes in operating procedure or misoperation are likely to occur.

From this point of view, UI serves a factor that greatly governs whether the copier is easy to be used or not, and in particular, in the copiers which have multifunction as is the case of the present copier, this is more so, and the maneuverability of UI matters the most.

Then, how should UI be configured to improve the maneuverability?

First of all, though it is the high-performance copier, if operations completely different from conventional operations are required, such copiers would only confuse users and lack user-friendliness, and it is evident that such copiers are desirable to achieve maneuverability similar to that of conventional copiers. For example, in the event that a user hopes to make three photocopies on A4-size paper at 100% magnification, it is important that the user could press a "100%" button from magnification setting buttons or keys, and from form setting buttons, press an "A4" button, and further press "4" by ten-keys to start copying, just like a conventional copier.

In addition, for users, it is important to provide necessary information only when required. Excess information not only confuses the user but causes misoperation.

Furthermore, scattered operating portions would cause nuisance to the user because the user must look this way and that and operating procedure becomes obscure. It is therefore desirable to concentrate the

operating portions to one place.

In addition, as described above, because the present copier must be able to be used by beginners to skilled experts and must be used differently in accordance with the level of user skill, UI must provide maneuverability that meets the usage of various users. That is, when a simple photocopy is made, it is desirable that the user is required to instruct basic modes only, such as magnification, form, color or black and white, etc., and when highly sophisticated editing is carried out, it is desirable for the copier to provide target-oriented maneuverability to dissolve complicatedness.

As the thing which satisfies all the above-mentioned requirements, in the present copier, for a UI display unit, a color CRT display is used, and for the mode or parameter selecting measures, an optical type touch-board using infrared rays is adopted.

According to this configuration, for example, if the user wants to have 100% magnification, all the user has to do is to directly touch the portion indicated "100%" in the column of magnification of the display screen (hereinafter called the soft button), and this provides the same operation sensation as that obtained in the conventional hard button. By the way, as a touch board, a pressure sensitive type is known. This must be actually pressed by a certain force, whereas the optical type only requires fingers or others to obstruct infrared rays and achieves excellent operating sensation. By the way, in the following description, the operation to obstruct infrared rays is expressed by "press" or "depress."

In addition, because on the CRT display, the display screens can be suitably configured, it is possible to give only necessary information to the

user when it is required. Furthermore, by suitably changing over the display screens, it is possible to accurately indicate the relevancy of information or operating procedure.

By this, it is possible to achieve target-oriented maneuverability. This target-oriented maneuverability can be described as follows, when a case to carry out “inlay composition” is taken for an example. As shown in Fig. 33, inlay composition is the editing to inlay a specified portion a of copy A in a specified portion b of copy B, and in carrying out this editing, several operations must be carried out; for example, first of all, the specified area a of copy A is trimmed and copied and then the specified area b of copy B is masked, and the area a of copy A is enlarged or reduced to the area b of copy B and inlayed. In other kinds of editing, several operations as described above may be required. Conventionally, when several operations must be continuously carried out as is the case of inlay composition, etc., what kind of operation was required was confirmed each time and such operations were conducted one by one. However, this is extremely troublesome and when even one necessary operation is skipped, the desired editing work is unable to be performed. As against this, for example, if items of “inlay composition”, etc. are displayed on a screen, and it is guided what and how should be set to carry out the relevant editing by pressing the relevant soft buttons to change over screens or display popup screens, the above-mentioned complicatedness can be dissolved and occurrence of misoperation could be avoided. This is the target-oriented maneuverability, which enables easy and direct operation.

Furthermore, since a color CRT display is used, not only highly

attractive screens can be built but also colors can be effectively used, and information can be more strongly impressed on the user, and as a result, the information can be conveyed to the user more accurately and more quickly. In addition, because the present copier is a color copier, too, it has functions concerning colors, such as color tone adjustment, color conversion, etc., and the present copier allows the user to confirm on the screen how the outputted copy colors would be.

As described above, by combining a color CRT display with an optical touch-board, it is possible to build up a UI which is easy to understand for beginners and which is free of complicatedness for skilled experts, and at the same time, which can set copy modes at one place and directly.

(II-2) Installation of UI

Fig. 14 shows how UI using a color CRT monitor is installed to the copier proper and its appearance and Fig. 15 illustrates the UI installation angle and height.

UI of the present copier comprises a 12-inch color CRT monitor 501 and a hard control panel 502 by its side as shown in Fig. 14. The size of the color CRT monitor 501 can be chosen as required but since it must be installed to the copier proper, excessively large one is not advisable, and on the other hand, in order to display soft buttons in an appropriate size and to arrange necessary information in a method easy to view, a certain size is required for a screen. In the present copier, with these taken into account, a 12-inch CRT monitor was used. In addition, the reasons why the hard control panel 502 is installed include the following: It is needless to say

that all the buttons can be made into soft buttons, but ten-keys used to set the number of copies or to enter security code, start button used to start copying and restart after interruption, stop button to interrupt copying, etc. must be kept ready to be pressed at any time, and in the event that these buttons must be made into soft buttons, these must be constantly displayed on the screen, and the display area for copy mode setting is narrowed by just that much, and the screen change-over must be carried out frequently or the size of soft buttons must be reduced to secure the required number of buttons. However, carrying out frequent change-over of screens is merely nuisance to the user and when the soft buttons are made smaller, they are difficult to be pressed and the screen is difficult to be seen, which is not preferable. Therefore, buttons required to be readily pressed, such as ten-keys, start button, etc. are formed as a hard control panel separately from soft buttons.

By ingenuity of color display, menus easy to see and easy to understand are provided for users and at the same time, an infrared touch-board is combined with a color CRT monitor 501, which can be directly accessed by soft buttons on the screen. In addition, by efficiently allocating the operation content to the hard buttons of the hard control panel 502 and the soft buttons displayed on the screen of the color CRT monitor 501, simplification of operation and efficient configuration of the menu screen have been achieved.

On the back side of the color CRT monitor 501 and the hard control panel 502, as shown in Fig. 14 (b) and Fig. 14 (c), a monitor control/power supply substrate 504, video engine substrate 505, CRT driver substrate 506, and other various substrates are arranged, and the hard control panel 502 is

arranged with a certain angle so that it faces further more to the center than the color CRT monitor 501 surface as shown in Fig. 14 (c).

In addition, the color CRT monitor 501 and the hard control panel 502 are mounted not directly onto the base machine (copier proper) 507 as illustrated but on a support arm 508 which is set up on the base machine 507. Because adopting a stand type color CRT monitor 501 in place of a console panel which used to be adopted as before enables the CRT monitor to be mounted three-dimensionally above the base machine 507 as shown in Fig. 14 (a), in particular, by arranging the color CRT monitor 501 in a right back corner of the base machine 507 as shown in Fig. 15 (a), it becomes possible to design the size of a copier with the console panel not taken into account as before, and downsizing of the machine can be achieved.

In copiers, the platen height, that is, the machine height, is designed to be waist-high, which is convenient to set copies and this height controls the height of the machine. Because a conventional console panel is mounted on the top surface of a copier, it is located at a place waist-high and close to a hand for convenient operation, but the operation section and the display section for selecting functions and setting execution conditions are located at a distance considerably away from eyes. In that respect, the UI of the present copier is located at the position higher than the platen, that is, close to the eye height, as shown in Fig. 15 (b), and provides eye-friendliness and at the same time, it is located not below but forward to the operator and on the right side, ensuring easy operation. Furthermore, by bringing the color CRT monitor 501 mounting height close to the eye height, the underside can be effectively utilized as a space for mounting UI control

substrate, memory card device, key counter, and other option kits.

Consequently, structural change to install a memory card device is no longer required and a memory card device can be additionally equipped without changing the appearance at all, and at the same time, the color CRT monitor 501 mounting position and height can be made user-friendly. In addition, the color CRT monitor 501 may be fixed at a specified angle, but it is needless to say that a structure to vary the angle may be adopted.

From the eighteenth line of lower left column on page 20 to the twentieth line of upper left column on page 24

(II-4) Configuration of display screen

Next, let's think how the screen should be configured to build a UI with good maneuverability.

Even in the case in which a color CRT monitor is adopted for UI, in order to provide information that supports multifunction, the volume of information is increased that much, and to take things simple and easy, the color CRT monitor has an aspect that a wide display area is required and it becomes difficult to respond to requirements for downsizing. In addition, in the event that a compact-size display unit is adopted, it becomes difficult to provide necessary information all by one screen not only from the viewpoint of display density but also from the viewpoint of providing an easily viewable and easily understandable screen for the operator.

Consequently, various ingenuities are required to provide an easily viewable and easily understandable screen by adopting a compact size color CRT monitor, as is the case of UI of the present copier.

Now, because the present copier is a color copier equipped with various editing functions, for copy modes to be set by UI, basic copy mode setting essential for carrying out copying, including color mode setting such as whether or not four-full color copying is carried out, three-color copying is carried out, or black and white copying is carried out, setting of paper size, magnification setting, and others must be performed, and in addition, in using editing functions, editing functions to be used must be directed and parameters necessary for the editing functions used must be set.

However, because the screen size is 12 inches, it is impossible to display all such information on one screen and it is not expedient, either. This is because as the information to be displayed increases, the screen becomes more and more difficult to see and to understand, and since the items to be set increase, unnecessary confusion may be brought about to beginners.

Consequently, it is necessary to divide a screen and have several screens to set copy modes, and for the dividing method, first of all, it is desirable to have a screen to set basic copy modes. That is, because the basic copy mode is the mode which must be set to carry out copying, the basic mode is essential to simply carry out copying but also essential to use editing functions.

Now, as basic copy modes, in addition to the above-mentioned color mode, paper size, and magnification, there are setting of binding allowance, presence or absence of use of F/P, adjustment of copying concentration, color adjustment, copy contrast adjustment, and others. However, the settings of color mode, paper size, magnification, and presence or absence of use of sorter when a sorter is mounted are essentially basic setting conditions, whereas others such as setting of binding allowance, presence or absence of use of F/P, copy concentration adjustment, color adjustment, copy contrast adjustment, etc. are items which may be set as required, and screens to set these items should be separated.

By dividing screens in this way, color mode, paper size, magnification, and presence or absence of use of a sorter when a sorter is mounted can be set on one screen (hereinafter this screen is called the basic

copy screen), and when copy concentration adjustment and others should be adjusted, other screens are called out and the desired adjustments and settings can be carried out.

In addition, it is extremely effective to carry out popup screen display. For example, let's think of magnification setting. The magnification settings generally used are automatic magnification and 100% magnification, but in addition to these, there are cases in which enlargement and reduction may be carried out as required, and since the present copier has a partial magnification function that allows copies to be duplicated at different magnifications in the longitudinal and transverse directions, respectively, selection as to whether or not partial magnification should be carried out must be performed, but if such settings are allowed to carry out on the basic copy screen, the screen display becomes complicated. Therefore, it is recommended that on the basic copy screen, as magnification setting items, three kinds of settings, namely, automatic magnification, 100%, and variable, are allowed to be chosen, and when "variable" is chosen, the popup is opened and the desired magnification can be set.

As clear from the foregoing description, because by dividing a screen properly in this way and displaying the popup screen suitably, "only necessary information" can be given to the user "only when it is necessary" and excess information is hidden and can be called out as required, the information will not confuse the user, and therefore, UI with satisfactory maneuverability can be built.

By now, setting of the basic mode has been described and next discussion will be made on the setting of editing functions.

To set the editing functions, there are following two concepts.

One is to display all the editing functions which the copier possesses and to allow the user to select the desired editing functions from them, and the other is to divide the editing functions into several classes in accordance with user level of skill and editing functions, and the present copier adopts the latter concept. One of the reasons is that according to the former, the target-oriented maneuverability is unable to be achieved. That is, to take “inlay composition” for an example, in the former, as described above, trimming of a specified area of copy A, masking of a desired area of copy B, etc. must be carried out one by one in a methodical way, whereas in the latter, by pressing the “inlay composition” soft button, all the operations can be carried out directly. In addition, in the users who use editing functions, there are users who are accustomed to using the editing functions and there are not, and according to the relevant degree of skill, the same editing functions may be used differently. Examples include the following:

Now, to think the case in which desired colors are added to the background of a specified area of a copy, as a method to specify the relevant area, it is thought to first surround the desired area by marker pens. Since the machine recognizes the marker pen color, the machine automatically detects the closed loop and can hatch the area surrounded by the relevant closed loop with the designated color. This is the easiest method to designate an area and even a user who has just learned editing can readily use it. However, the method to use a marker pen is to write a closed loop in the copy with a marker pen and smears the copy. To avoid this, an edit pad is used to designate a desired area, but since by this method, coordinates of a

desired area must be entered in the edit pad, labor of operation increases and at the same time, to enter coordinates, a certain level of skill is required, too, and therefore, this is a more sophisticated editing function than the method to use a marker pen.

Furthermore, in addition to hatching, there are cases in which trimming and other editing functions should be simultaneously performed in the relevant area. In such event, the operation becomes still more complicated, considerable degree of skill is required to make full use of the functions.

In this way, there are editing functions which involve great difficulties to make full use of them, suggesting that it is desirable to divide editing functions into several stages and hierarchize. In addition, by this, the purpose of UI of the present copier of providing “only necessary information to the user when required” can be achieved. That is, when simple editing is carried out, a screen that responds to the purpose is called out, the desired editing functions are designated, and required parameters are set, and no extra information is displayed, causing unnecessary confusion to the user.

In addition, by hierarchizing the editing functions, there is an advantage that software can be easily created. That is, when editing functions are put together, branches are markedly increased and great difficulties are involved in creating software, but when various editing functions are classified and hierarchized by similar functions, the number of branches can be reduced, and creation of software is facilitated by just that much.

As described above, for a screen to guide the setting of the copy mode, by classifying the basic copy mode and the edit mode and by suitably hierarchizing each of the basic copy mode and the editing mode, respectively, only necessary information can be conveyed to the user accurately, where and when needed, and UI which is convenient to use can be built without generating misoperation.

Next, what becomes important is how the basic copy mode and the edit mode should be hierarchized, respectively, and what kind of setting items should be established for each hierarchy. For the basic copy mode, as described above, color mode, paper size, magnification and sorter are organized into one group and copy concentration adjustment, etc. are organized into another group.

In addition, how many hierarchy the edit mode should be divided could be suitably decided, and as described above, it is recommended to divide the edit mode into at least three stages, for example, a stage to use a marker, a stage in which an edit pad is used and one editing function only can be carried out, and a stage in which all the editing functions can be used.

(II-5) Pathway and its layout

The next problem is how the screen should be laid out.

First of all, when the functions or mode setting items are hierarchized as described above, it is obvious that the display area of each hierarchy must be set. In addition, it is recommended to display basic items only in the relevant hierarchies in the display area of each hierarchy and to popup-display all others so that the desired mode can be set in the minimum steps in all hierarchies. In addition, it is also necessary to call up the

display area of each hierarchy at any time. This is because there would be a problem in view of the maneuverability if the display area of the hierarchy in which the desired editing can be carried out is unable to be called out at any time and immediately whenever the user hopes to carry out editing.

These display areas are areas in which functions are chosen for each hierarchy (function choosing area), and hereinafter this is called a pathway.

Based on the foregoing discussion, in the present copier, the following pathway is decided to be provided.

(A) Basic feature pathway

Referring now to drawings, the pathways adopted by the present copier are described.

What is shown in Fig. 20 (a) is a screen which displays a basic feature pathway, and first of all, using this drawing, the layout of the overall screen will be described.

As shown in Fig. 20 (a), the display screen is divided into two: a message area A and a pathway B.

The message area A uses the top three lines of the screen, the first line is designated for the state message, the second line to the third line are designated for the guide message when any contradiction is found in selection of functions, for the message related to apparatus trouble condition, and for the warning information message, and specified messages are displayed, respectively. In addition, the right edge of the message area A is used for the number of sheet display area, and the set number of copies entered by ten keys and the number of copies in duplication are displayed.

The pathway B is an area in which various kinds of functions are

chosen, and has each pathway of basic feature, added feature, copy quality, tool, marker editing, business editing, free-hand editing, and creative editing, and the pathway tab C is displayed in correspondence to each pathway. To the pathway B, a soft button D, which is an alternative and selects functions when touched, icon (picture) E which changes in accord with the chosen function and displays the function, indicator F which displays reduction/enlargement ratio, etc. are displayed. In addition, each pathway has a popup to improve the maneuverability, and “△” popup mark G is given to pathways whose popup is opened when the soft button D is pressed. And by touching the pathway tab C, the pathway can be opened, and the desired pathway can be displayed at any time when needed.

Now, mode setting is carried out for each item of color mode, paper size, magnification, and sorter which are essential to execute copying in the basic feature pathway.

The color mode has alternatives of full color in which copies are made by four kinds of toner, Y, M, C, and K (black), three path color to make copies by three kinds of toners excluding K, black in which regular black and white copy is carried out, and red/black, and the default automatically chosen when the power supply is turned on can be optionally set by the user. By the way, the red/black mode is the mode to make copies by the use of red and black toners only, and is the mode used when the black portion of a copy is converted to red, the red portion of the copy is deleted, or colored by red, and choosing the relevant red/black mode and starting to copy makes the red portion of a copy much redder and the black portion much blacker, thereby executing generation copying.

The paper size has alternatives of automatic paper selection (APS) and trays 1, 2, and 3, and the default is APS.

The magnification has three alternatives of 100%, automatic magnification selection (AMS) which sets the magnification from the paper size and copy size when paper is chosen, and variable (optional variable power), and on the indicator F, the set magnification, computed magnification, or AUTO is displayed. When “variable” is chosen, the popup shown in Fig. 20 (b) is displayed, and magnification can be set by the preset magnification or in the range from, for example, 50% to 400% in increments of 1% by a scroll button H. “Anamorphic” in the popup of the same drawing means the partial magnification function which can independently set the longitudinal and transverse magnifications of a copy, and pressing the relevant soft button opens the popup shown in Fig. 20 (c) and the magnification in the longitudinal direction of the copy and that in the transverse direction can be set independently and optionally, respectively.

As described above, when the detailed setting information for specific functions is popup-displayed and the popup is opened as required, the pathway screen display can be made easy and simple and at the same time, the minimum required information only can be displayed, and the user can be therefore accurately guided. By the way, the default can be, for example, 100%.

The sorter is an item to choose whether the copy is outputted to a top tray or a sorter is used. However, this item of sorter is not constantly displayed but when a sorter is not mounted, as shown in Fig. 20 (d), the sorter is brought into a invisible state. When a sorter is not mounted, the

outputted portion is limited to the top tray, and there is no need to choose whether or not the sorter is used, and by this, the user is no longer given any excess information and can avoid occurrence of misoperation.

This concludes the description on mode setting in the basic feature pathway, and only with this mode setting, regular HIFI copying which does not provide any editing can be carried out.

From the eleventh line of upper left column on page 47 to the seventh line of lower right column on page 52

(II-10) button system

It has been described that in the present copier, for buttons, soft buttons and hard buttons are provided. In this section, properties and functions of relevant buttons are described.

(A) Hard button

The hard button is a button which is arranged on a hard control panel, and ten-key, asterisk, clear, start, stop, interrupt, all clear, Auditron, information ON, information OFF, and language buttons are mounted.

These buttons must be constantly ready for being depressed, and therefore, are disposed as hard buttons separately from soft buttons which set the copy mode.

Now, functions of each button are described as follows:

The ten-key button comprises numerals from 0 to 9 and is used for setting of number of copies, code entry and data entry in the diag. mode and for entry of security code when tools are used, and are made invalid while job is generated or while job is interrupted.

The asterisk "*" button is a button used for entry of security code or password when the security code or password is used in the tool pathway. However, the entry method differs between the key operator and the custom engineer, and by this, functions which the key operator is allowed to use are restricted.

The start button is used to start job and restart after interruption, and in the diag. mode, it is used for saving entry of code value and data value

and starting I/Os, etc. Operating the start button while preheating the machine causes the machine to make auto-start upon completion of preheating.

The stop button is used to interrupt the job at the end of copying while the job is being executed and to stop the machine after copied paper is discharged. In addition, in the diag. mode, the stop button is used to stop (interrupt) I/O check, etc.

The interruption button is used to enter the interruption mode during the primary job except during the job interruption and return to the primary job during interruption of job. In addition, operating this button during the execution of the primary job causes the machine to enter the reservation state, interrupts or finishes the job at the end of discharging copied paper, and begins the interruption job.

The all-clear button returns all the set copy modes to defaults and return to the basic copy screen except tool screens which are open, and while the interruption job is being set, the copy mode returns to the default, but the interruption mode is not cancelled.

The Auditron button is operated to enter the security code when the job is started.

The information button comprises an ON button and an OFF button, and is ready to accept information except while copying is being executed, and by the ON button, the information screen for the screen currently displayed is displayed, and by the OFF button the information screen is saved. For this button, a toggle button may be used, that is, pressing the button once turns ON and depressing it once again turns OFF information,

but in order to achieve user-friendliness, the ON button and OFF buttons are provided.

The language button is operated when the language on the display screen is changed over. Consequently, for each display screen, a plurality of languages, for example, Japanese and English data are possessed, and they are optionally chosen.

By the way, on the hard control panel, in addition to the above-mentioned buttons, LED (light-emitting diode) lamps are suitably installed in order to display the button operating condition. Lamps may be installed to all the hard buttons but to the buttons which are seen depressed when the screen is seen may not be necessary to dare to install lamps, and consequently, in the above-mentioned hard button the LEDs should be installed to the interruption buttons only.

(B) Soft button

The soft button is configured with a touch board 981 disposed to the front surface of a color CRT monitor 980 as shown in Fig. 32 (a). In the specified place of the color CRT monitor 980, button patterns of rectangle, triangle, and other various shapes are displayed. The touch board 981 has a configuration in which, for example, as shown in Fig. 32 (b), a light-emitting diode 982 which emits infrared rays are disposed on the upper side and on the left side, and on the opposite lower side and on the right side, infrared sensor 983 is disposed. Consequently, when the user intercepts infrared rays with an intention to touch the button, the infrared ray sensor output becomes smaller at the intercepted place and it is possible to learn the coordinates of the selected button from the relevant infrared sensor

position. These processes are carried out by CPU534 of Fig. 18 as described above.

(C) Shape and size of the soft button

As seen in the figures described to this point, each soft button has its own shape, and the buttons of the same shape vary in sizes in accord with the screens displayed. These are determined by characters of the button, such as whether the relevant button is used for function selection, or for scroll, or how many buttons must be disposed in the popup.

Fig. 34 shows the examples of the button shape and the size. By the way, the unit of numerical value in the drawing is the number of tile.

Fig. 34 (a) and 34 (b) show buttons generally used as selection buttons, and the button in Fig. 34 (a) is used, in general, for function selection in each pathway and the button in Fig. 34 (b) is used in the case of popup which is displayed in a narrow range like a button to select color, for example, in Fig. 20 (h) or even in the case of whole popup where a large number of buttons are arranged in addition to the bit-map area, for example, in Fig. 22 (b). Consequently, the buttons for which icons are displayed when chosen are of the same size, as shown in Fig. 34 (c).

Fig. 34 (d), (e), and (f) are buttons of a pathway tab, and Fig. 34 (d) is used as a tab of a pathway which is called up on the screen like a basic feature pathway of, for example, Fig. 20 (a), Fig. 34 (e) is used as a tab of a pathway, which is not called up like a tab of a tool pathway of Fig. 20 (a), and Fig. 34 (f) is used as a tab of each editing pathway displayed on the screen in which the basic copy pathway is displayed just like each editing pathway of Fig. 20 (a).

Fig. 34 (g) is used as a popup mark.

Fig. 34 (h) and 34 (l) are patterns used for up/down of numerical parameters, scroll at the time of area correction, etc., respectively, and the pattern of 34 (h) is used or the pattern of 34 (i) is used in relation to the layout, etc. of other buttons.

Fig. 34 (j), (k), (l), and (m) are patterns used as general ON/OFF buttons, and Fig. 34 (j) and Fig. 34 (k) are used for buttons of registered color, concentration pattern, etc. of, for example, Fig. 21 (b), and Fig. 34 (l) is used for setting sharpness stage of, for example, Fig. 20 (j), and Fig. 34 (m) is used when buttons are arranged with no space left between them like color sensitivity buttons of, for example, Fig. 23 (g).

(D) Actions of buttons

Soft buttons must have several conditions. After the soft button is pressed, the display must be changed from that before the soft button is pressed in order to notify the user that the relevant soft button is being pressed, and as described above, when a soft button of a certain mode is pressed, buttons in the modes contradicting to the relevant mode must be disabled for selection.

In addition, in order to prevent extra information from being given to the user, it is desired that unnecessary soft buttons should not be displayed. For example, when a sorter is not mounted, the sorter selection soft button (see Fig. 20 (a)) is never chosen, and it is obvious that there is no need to display the sorter selection soft button.

As described above, for the soft button condition, selection enable, under selection, selection disable, and invisible conditions are required.

Description will be made on each condition as follows.

In the selection enable condition, buttons can be seen standing out and to indicate the sensation to be able to be altogether pressed, the button color is same as the background, and furthermore as shown in Fig. 35 (a), shadow 985 is given.

In the under-selection condition, the button color is made whitish and sensation that the pressed light is altogether turned on is given. By the way, in the event that the relevant button has any characters or icons, the characters and icons display shall be kept as it is, and the ground of the button alone is preferably made whitish. In the event that any character or icon is erased, the user cannot identify in which mode the relevant button is.

The selection disable condition works in such a manner that in the event that there are modes which contradict each other, such as automatic magnification and automatic paper selection, the other is prevented from being chosen if one is selected, and the button ground color should be the same as that of the selectable condition but as shown in Fig. 35 (b), the shadow is not provided. By doing this, the sensation as if the button is pressed into the background and cannot be pressed is obtained.

In UI on the conventional console panel, all the buttons are made constantly selectable and there are cases in which the user may choose modes which contradict each other, and in such event, warning messages are displayed, but making the other mode unselectable when one of the contradicting modes is chosen prevents the user from daring to choose such mode and nuisance to confirm warning messages one by one as before can be eliminated.

However, it could be thought that the user mistakenly presses unselectable soft buttons, and in such event, a warning message is displayed that the button is not selectable.

By the way, a method to erase the button of the other mode is assumed when one of the contradicting buttons is pressed, and by doing this, no warning message whatsoever has to be displayed because no contradicting mode is set at all, but deleting the button eliminates a means to confirm whether or not the relevant function is provided and therefore it is not desirable.

The invisible state is the condition in which no button is displayed. For example, when a sorter is not mounted, selection of the sorter is not chosen, and therefore, the sorter selection button is not necessarily displayed. As against this, if the sorter button is constantly displayed, the user may mistakenly press the button, and some kind of message must be displayed each time. To solve this kind of nuisance, the button is brought into the invisible state.

This state is applied to the job program button, too. That is, since the job program is a function which is first made effective when a memory card is inserted, it is not necessary to be displayed when the memory card is not inserted and therefore, the button is made invisible.

By the way, whether or not the button is brought to the invisible state is automatically decided by the machine. Whether or not the sorter is mounted or the memory card is inserted can be recognized by the machine, and this is why the machine can do this automatically.

The foregoing is the description on the state given to each button.

Soft buttons can be classified into several kinds in accord with their relationship with modes or soft button functions, etc. This will be described as follows.

First of all, there is a multi-choice button for selecting functions. This is a button of group in which one button is turned on when the relevant button is pressed and the other buttons are turned off, and for example, the buttons offered for alternatives of each column of color mode, paper selection, magnification, etc. of Fig. 20 (a) fall under this. That is, in the color mode column, pressing the full-color button when three-color button has been chosen and remains in the selected state, the full-color button is turned on and the three-color button is turned off. This is because the two-color mode is unable to be set simultaneously. Consequently, one of the multi-choice buttons is constantly kept in the selected state.

To the multi-choice buttons, the default state is set in many cases and when the all-clear button on the hard control panel is pressed, they are set to the default state. In addition, if, of the multi-choice buttons, a button with a popup mark is pressed, it is needless to say that the popup is opened.

In the buttons to select functions, there are independent selection button which has only one alternative as against multi-choice buttons. Examples of this independent selection button includes the job program button and buttons of each function, etc. installed in the business editing pathway shown in Fig. 22 (a), and these independent selection buttons turn on immediately they are pressed, and in many cases, popup is opened. In the popup, parameters are set, the save/close button is pressed to close the popup, and then, the button is retained to the set state.

To turn off the independent selection button which is brought to the ON state, the cancel button should be pressed in the popup.

Referring now to actions of the independent selection button, they can be explained as follows. Now, in Fig. 22 (a), assume that a black \rightarrow color conversion button is pressed to convert the black portion of the copy into a desired color. A popup similar to Fig. 22 (b) opens. In the relevant popup screen, as the black \rightarrow color conversion function parameters, area which is black \rightarrow color conversion is carried out, color to be converted, and the concentration pattern must be set, but when the popup is opened, no color buttons, no concentration pattern buttons are turned on. That is, no default state is set. This is because the black \rightarrow color conversion function is the function to convert the black in the copy into any desired color chosen from a total of 16 colors of 8 standard colors and 8 registered colors, and to which color the black should be converted varies in accord with cases and it is not appropriate to preset colors. Pressing, for example, a red button, registered color, in the relevant popup brings the relevant button to the selected state, and further pressing the save/close button, the popup is closed and the screen of Fig. 22 (a) appears. In such event, the black \rightarrow color conversion button is displayed white, and is brought to the ON state, that is, to the selected state. When the black \rightarrow color conversion function is turned off under this state, the relevant button should be pressed once again to open the popup. In such event, in the popup, to the red button, icon of paint tube as shown in Fig. 20 (h) is displayed and the button is set to the ON state. Then, pressing the cancel button, the popup is closed and the screen of Fig. 22 (a) appears. In such event, the black \rightarrow color conversion button is

brought to the OFF state, that is, to the selectable state.

This concludes the description of the independent selection button, but it must be further mentioned that there are some independent selection buttons for which no popup opens. For example, the mirror image button in creative edition shown in Fig. 23 (a) is such a button. That is, because the mirror image is a function to form an image when the copy is viewed from the back side by reversing the image with the center of the secondary scanning direction set as an axis, there is no parameter to set, and consequently, there is no need to open any popup.

To turn off this kind of independent selection button for which no popup is opened, two methods are considered. One is to assign the relevant button as a toggle button and allow it to repeat ON/OFF every time the button is pressed and the other is to use the cancel button.

Which method should be adopted is optional, but in the present UI, the latter is adopted. The reason is as follows. First of all, it is not appropriate to use a toggle button for the independent selection button which is designed to open a popup. That is, the deed to set parameters in the popup is something which the user intentionally carries out and therefore, the parameters must be made difficult to be canceled, and consequently, the above-mentioned cancel button is installed. As against this, if this kind button is made into a toggle button, mistakenly pressing the button once again cancels the relevant function and parameters already set, and it would be apparent that such thing is not desirable to occur. Next mentioned is the standardization of operating procedure. If the operating method to turn off differs for the same independent selection buttons between the cases when

the popup is opened and when the popup is not opened, the user would get mixed up and the machine becomes inconvenient to be used. With the foregoing reasons, even when the independent selection buttons for which no popup is opened are turned off, the cancel button is used to turn them off.

For the scroll button, the up button and the down button make a pair as shown in Fig. 34 (h) and Fig. 34 (i), and pressing the up button brings the scroll button into the ON state to increase the numerical value and releasing the up button turns off the scroll button and causes it to return to the selectable state. This same principle applies to the down button and pressing the down button turns on the scroll button to reduce the numerical value and releasing the down button turns off the scroll button.

The scroll button is used to modify and delete the size of the area and the point set by the edit pad. Now, three areas A, B, and C are displayed in the bit-map area as shown in Fig. 36 (a). Under the initial state, for example, a leftmost and uppermost area, the area shown by A in the case of Fig. 36 (a) is black and white reverse-displayed. Therefore, every time one scroll button 985 is pressed, the areas of B and C in the figure are black and white reverse-displayed. The moving order may be the order of area registration or order of the position of area, for example, from left to right, or top to down. And for example, pressing the area/point cancel button with the area C black and white reverse-displayed can delete the area C. Pressing the other scroll button 986 can scroll the area in the reverse direction. In addition, in the event that the area or the point is designated, when the scroll button is held depressed, the area/point may be repeatedly moved without stopping in the specified procedure.

In this way, there are two functions for the scroll button, in which the scroll button is activated differently. In the case of setting the numerical values, the numerical value is varied while either one of the buttons is held depressed and when the upper limit value or lower limit value is reached, changes of the numerical value is stopped. In such event, the relevant button is made unselectable state with the shadow removed. By the way, the button may be allowed to display the regular selected state while the scroll button is held depressed, but as shown in 987 of Fig. 36 (b), the shadow width may be one half that of the selectable stage (988 of Fig. 36 (b)).

In addition, the numerical value changing speed when the scroll button is held depressed may be constantly changed at regular time intervals, but for example, the numerical value may be changed by gradually increasing the speed, for example, changed by 1 step until the first depression and then after 250 msec, changed by 1 step, and then after next 240 msec, after 230 msec, 220 msec ... changed by 1 step each, and finally, for example, changed by 1 step every 40 msec.

Up to now, description was made that the button is turned on when it is pressed and turned off when it is released, but description will be specifically made as follows on the conditions when the button is turned on and when it is turned off.

When infrared rays are interrupted within the area of the soft button, the relevant button is turned on and is changed from the selectable state to the selected state and if it is released as it is, the button is kept to the selected state, and at the same time, mode check and fixation take place.

That is, when the infrared rays are interrupted, the button is turned on but in this event, the mode is not yet fixed and when the button is released, the mode is for the first time checked and if there is contradiction, the mode is fixed. It can be thought to fix the mode when the start button is pressed, but for the user, it is convenient to find out whether or not the user has carried out correct operation when some kind of action is made, and that is why it is defined in this way.

There is a case in which the user may move the finger from the outside the button area to the area inside as shown by the arrow mark A of Fig. 36 (c). In such event, the button is turned on when the finger crosses the boundary of the button shown by 989 in Fig. 36 (c). In addition, when the user moves the finger as shown by the arrow mark B in Fig. 36 (c), it is judged that the finger is released from the button when the finger crosses the boundary shown by 990.

Furthermore, as shown in Fig. 36 (d), there are cases in which buttons are pressed one after another in a short time. In the event that the touch board is used as is the case of the present UI, actual buttons do not exist just like the buttons of the console panel, and consequently, the touch-board surface is free of any protrusion and is smooth; fingers may slip and a plurality of buttons may be pressed in a short time as shown in Fig. 36 (d). The figure shows when infrared rays are interrupted first at point P, and thereafter, up to point Q, infrared rays are continuously interrupted and are released at point Q. In such event, the button 991 turns on when the finger crosses the boundary 993 and whether or not the button 992 is turned on is judged by whether the finger is moved quickly or slowly. When the

user moves the finger slowly, it can be judged that the user intends to turn on not only button 991 but also button 992, and when the user moves the finger quickly, it is judged that the user does not have an intention to turn on the button 992.

Specifically, a specified time T is decided, and when the finger goes over the boundary shown by 995 of the button 992 in less than time T after the button 991 is turned on, the button 992 is not turned on but only the button 991 is turned on. Consequently, in such event, whether buttons 991, 992 are multi-choice buttons or independent choice buttons, the button 991 only is turned on. In addition, when more than time T passes before the finger crosses the boundary 995 of the button 992, the button 992 is turned on. Consequently, in this event, if buttons 991, 992 are multi-choice buttons, the button 991 is turned off and only the button 992 is turned on, and in the case that buttons 991, 992 are independent choice buttons, both button 991 and button 992 are turned on. By the way, how long the specified time T should be is optional, but for example, about 125 msec should be acceptable.

The reason why things are defined above is to prevent flashing. That is, if a button is constantly kept in the ON state when the button is pressed, when the multi-choice button is continuously pressed in a short time, flashing is generated and the great difficulty to see results. This becomes particularly conspicuous when buttons are arranged with no space left between one another as is the case of the color sensitivity of Fig. 23 (g). As against this, in the event that the buttons are turned on and off under the conditions as described above, flashing is not generated and even if flushing should be generated, the cycle is comparatively long, and the difficulty to see

can be prevented.

The foregoing are general conditions to decide ON/OFF of buttons and modes, but the scroll button differs. It is the same as above that the scroll button is turned on when it is pressed, but in such event, the pressing of the scroll button is decided, and scrolling of numerical values or areas, or points is started, and when the finger is released, the button is turned off, and scroll action is stopped. This is natural because scrolling must be carried out only while the scroll button is held depressed.

From the twentieth line of upper right column on page 55 to the ninth line of upper right column on page 63

(A) General popup

Now, action of general popup will be described as follows. First of all, action when the popup opens is described as follows.

As described up to now, the popup can be opened by pressing a button with “△” popup mark assigned, but to be more specific, in order to standardize the soft button action, the popup is intended to open and is displayed when the finger is released from the soft button area.

Examples are taken as follows. Now, for example, in the copy quality pathway screen of Fig. 20 (g), a color suppression button is pressed to suppress a certain color. Then, the relevant button is turned on, that is, brought into the selected state, and when the finger is released from the relevant button, the screen changes to the one of Fig. 20 (h) and the color suppression popup P is displayed.

In such event, to the popup P, shadow Q is added and popup P is displayed as if it stands out. In addition, the ground of popup P is displayed in the color same as that of the relevant pathway ground. This would give the user a feeling of security and at the same time a screen easy to see.

By the way, in other screens, popup shadow is omitted.

Furthermore, the popup is rewritten to the button position before the popup is opened and the size is decided with the popup content, the number of popup provided inside the popup, etc. taken into account. Consequently, there is popup which is rewritten on part of the pathway as is the case of Fig. 20 (h) and there is popup which is rewritten on the whole

surface as is the case of Fig. 23 (b), etc.

By the way, as a popup display method, as shown in Fig. 37, a method in which the button 996 is being zoomed to gradually increase its size to become the popup 997 can be adopted. According to this, because the button is gradually expanded and the way how the hidden information is disclosed can be visualized, the sensation that the information really pops up can be expressed, attracting the user interests to focus on the popup. However, to adopt this display system, a high picture-quality CRT display must be used, and where a bit-map display system is adopted, this ingenuity can be easily put into practice but as is the case of the present UI where a tile display system is adopted, zooming becomes awkward and the difficulty is involved from the viewpoint of software preparation. Therefore, in the present UI, this system is not adopted.

When the popup is displayed, buttons may be displayed outside the area of popup. For example, in Fig. 20 (h), the copy concentration and copy contrast buttons are displayed. In such event, the user may press mistakenly or intentionally these buttons and it have to be decided in advance what kind of actions the system should take in such event. This is because the user does not always carry out operation in the proper procedure and as far as the buttons are visible, the user has a possibility to press these buttons. Therefore, buttons outside the popup area are, in principle, made effective. This is because even when popup is open, other functions are able to be set. For example, when the color mode is set to black and white on the screen of Fig. 20 (a), the magnification variable button is pressed and 50% is chosen in the popup of Fig. 20 (b). Assume that at this point of time, the

user noticed that the color mode is set to black and white and want to change it to full color. All the user has to do is to press the full-color button on the screen of Fig. 20 (b); then, the full-color mode is made effective. By this configuration, the trouble of closing the popup each time and returning to the original screen can be eliminated.

However, as is the case of the manual of copy concentration of Fig. 20 (h), the button to open popup is made invalid. When the relevant button is pressed, the manual of copy concentration enters the ON state temporarily but when the button is released, it enters the OFF state, that is, returns to the selectable state. In addition, the specified warning sound is issued and at the same time, for example, a message such as “close the popup and choose”, etc. is displayed. In addition, as is the case of a button of paper size column of Fig. 20 (b), the button part of which is rewritten by the popup is displayed in the selectable state with shadow added, but is designated as a button which is unable to be used. Consequently, when the relevant button is depressed, the specified warning sound is issued and at the same time the specified warning message is displayed. Needless to say, on the screen of Fig. 20 (b), setting the popup size properly can hide all the buttons of paper size column and consequently, definitions as described above are no longer required, but there is a problem of visual quality such as balance between popup size and number of buttons, etc., and in addition, by displaying part of buttons, it is possible to indicate that the relevant popup is located on the extension of the original screen, and that is why this kind of configuration is adopted.

Next discussion will be made on the case in which a pathway button

is pressed while the popup is open. For example, Fig. 20 (h) is the figure that indicates the state in which the color suppression popup is open on the copy quality pathway. In such event, since pathway buttons of other pathways are displayed, the user has a possibility to press them. However, changing the pathway means that the operation enters a completely different category and it is not desirable to move to a different pathway under a half-baked state in which the popup is open. Therefore, it is designed to prevent the operation from moving to other pathway unless the job of the relevant pathway is completely finished. Consequently, when the popup is displayed, the pathway button is made invalid.

Next, how the popup should be closed must be discussed. The popup is closed when the save/closed button or the cancel button in the popup, or all clear button on the hard control panel is pressed.

However, the popup which is opened by the job program button is an exception and even when the memory card is removed from the card reader, the popup is designed to be closed. That is, because the job program is a function to read the desired job from the memory card and carry out copying, when the memory card is removed, it is meaningless to keep the relevant popup to the open state.

For the similar reasons, the relevant button is normally brought to the unselectable state and is made selectable only when the memory card is inserted into the card reader. That is, when the memory card is inserted, the relevant button is brought to the selectable state and when it is depressed, the popup is opened and the desired job can be chosen from the jobs stored in the memory card or the job currently in execution can be

registered to the memory card. And the relevant popup can be closed when the save/close button is pressed, but even when the memory card is removed with the popup up open, the popup is closed.

When the popup is closed by the save/close button, all the parameters set on the popup are registered effectively and when the popup is closed by the cancel button, all the parameters set on the popup are made invalid. In addition, when the popup is closed by the all clear button, not only the parameters set by the relevant popup but also all the registered parameters are made invalid, and the machine is brought into the initial state.

And when the popup is closed, in principle, the screen before the popup is opened appears. For example, choosing Color Conversion on the basic screen of creative editing of Fig. 23 (a) causes the popup to open and displays the screen of Fig. 23 (g). Pressing the pallet button on the “From” side to set the color to be converted further opens the popup and the screen of Fig. 23 (h) appears. Now, choosing the desired color and pressing the save/close button registers the relevant color and the screen returns to the immediately preceding screen shown in Fig. 23 (g), and then, pressing the save/close button on the Fig. 23 (g) screen registers the color conversion function and return to the screen of Fig. 23 (a).

In this way, the popup has a hierarchical structure and the popup is opened one after another, and the popup is closed in the order reversal to the opening order.

However, there are many items that must be set, and consequently, if the popup is formed in many layers and the screen must return to the

immediately preceding screen one by one to return to the initial screen, which takes time and is troublesome. Therefore, from the viewpoint of guiding the operation procedure, it would be convenient not to return to the immediately preceding screen, but to open the popup one after another and to return the screen to the initial screen when the final parameter setting is completed. That is, the popup is circulated. Examples of this kind of popup include a popup which is opened by the ON button of the film projector of the added feature pathway and a popup which is opened by an add-function button installed to the creative editing.

The case of the film projector could be explained as follows. First of all, pressing the ON button of the film projector in the added feature pathway of Fig. 38 (a) opens the popup and moves the screen to the screen of Fig. 38 (b). To this popup, the F/P operating procedure is displayed, and for the buttons, cancel button and calibrate button are displayed. Pressing the cancel button in such event returns to Fig. 38 (a) but pressing the calibrate button allows white balance adjustment to take place and the screen automatically moves to the screen of Fig. 38 (c). When a 35-mm negative of the projector column is chosen in this event, the popup opens and the screen of Fig. 38 (d) appears. Pressing the Other button on this screen further opens the popup and the screen of Fig. 38 (e) appears. "Other" is not a general film and consequently, special adjustment is required, and the relevant popup opens. Pressing the scan button here automatically begins adjustment, and when the adjustment is completed, the screen returns to Fig. 38 (d). Now, pressing the save/close button in this event moves to Fig. 38 (c) and further pressing the save/close button returns to Fig. 38 (a). As

described above, the order of closing the popup differs from the order of opening the popup.

In addition, the add-function popup is the same, and for example, choosing the trim in Fig. 23 (a) causes the screen of Fig. 23 (b) to appear. On the screen, necessary parameters are set and the add-function button is pressed to further change the color balance; then, the additional function menu is displayed as popup, and when the desired menu is chosen, the relevant function popup screen appears, and on the screen, necessary parameters are set and the save/close button is pressed; then, the screen returns to the trim popup screen of Fig. 23 (b).

As described above, since the popup has a hierarchical structure, when it is closed, in principle, it returns to the immediately preceding screen, but in order to guide the user operation, there is the popup which changes cyclically, too.

Next, since it is assumed that the start button may be pressed while the popup is being displayed, actions in such event must be defined.

Because the relevant popup task is completed only when the popup is closed, under the popup open state, the task is not completely finished, but as long as parameters to be set in the relevant popup are entered, the conditions necessary to execute copying are satisfied, and in such event, the start button is designed to be effectively functioned. That is, in the event that the conditions to execute copying are satisfied even in the condition in which the popup is open, the start button is made valid.

The reason to have this kind of definition is as follows. If the default state is set to all the modes or functions, or parameters, the start

button is constantly valid. This is because with respect to the parameters which the user does not set, default is set. In the case of a black and white copier, this kind of thing is possible but since the present copier is a color copier, color setting is required and the color tastes vary in accord with users, and the color adjustment varies in accord with the copy content. Therefore, for example, it is possible to set blue as the default in the color pallet, but for the user, this would be great nuisance. Consequently, as far as the color is concerned, it is popular practice that the default is not set and the start button is not always valid. Therefore, as described above, only when all the parameters to be set by the popup are entered, the start button is made valid.

(B) Special popup

As described above, actions of general popup which is opened by depressing the button with the popup mark assigned have been described, and the next description will be made on special popup.

There are popup which automatically opens subject to execution of some operation, and SSI (single sheet inserter) popup, run frame, Are you sure popup to confirm user intention, and whole surface/area popup fall under this category.

SSI is a function with higher priority and is chosen when paper is inserted in the manual paper feed tray. However, since the paper size is unable to be detected, the user must designate the paper size. Therefore, when the paper is inserted, the popup shown in Fig. 39 (a) is automatically displayed, and the user is allowed to designate the paper size on this screen. And copying begins and paper is fed from the manual paper feed tray, this

popup is automatically closed. Consequently, as clear from Fig. 39 (a), in the SSI popup, no save/close button and no cancel button are equipped. This is because as described above, SSI is sure to be chosen when paper is inserted and when the paper is fed, there is no reason to keep the popup open.

However, when other popup is displayed, SSI popup is unable to be opened. This is because priority is given to the popup presently open as described above. In addition, because the paper selection is the mode installed only to the basic feature pathway and it is the mode which is not included in any other pathways, the relevant popup is unable to be opened in any other pathways than the basic feature pathway. Consequently, even pressing the start button with the SSI popup unable to be opened cannot start copying and causes a specified message to be displayed. However, the following can be adopted. That is, when the start button is pressed under the condition in which the SSI popup is unable to be opened, first of all, the run frame later discussed is displayed, and on the run frame, the SSI popup of Fig. 39 (a) is rewritten, and then, if the paper size is designated, the start button is effectively functioned.

Run frame is a screen which is displayed when the start button is pressed to start copying, and even when copying is started with the popup opened, the popup is rewritten on the run frame. The example is shown in Fig. 39 (b). In the run frame, color path which indicates the toner color presently copied, number of copies set (Copies Selected), number of copies presently made (Copies Made), and magnification are displayed, and though not illustrated, modes which can be set under the run state and function

menu are displayed. By this, the mode that can be set and functions can be accurately recognized even during copying operation. However, this kind of setting is possible only when copying is temporarily stopped.

And when copying is completed, the screen returns to the original screen.

Are you sure popup is displayed when the job moves between pathways. As described above, each editing pathway can coexist with the basic feature pathway but they are exclusive to one another. And when the job moves from one editing pathway to the other editing pathway, the job set in the previous editing pathway is made invalid. Consequently, when the job moves between editing pathways, it is necessary to confirm the user intention whether it is okay for the user. It is the Are you sure popup that is displayed in such event, and the example is shown in Fig. 39 (c). For example, assume that business editing is carried out to that point, and the process is returned temporarily to the basic feature of Fig. 20 (a), and then the marker editing pathway button is pressed. Then, the screen of Fig. 21 (a) appears. In the event that the trim button is pressed there, the Are you sure popup opens and the screen of Fig. 39 (c) appears. By the way, when the job returns from business editing to the basic feature, the relevant Are you sure popup is not displayed. This is because business editing and basic feature can coexist each other. As against this, business editing and marker editing are in the exclusive relation and the popup as shown in the figure is displayed to confirm the user intention.

Pressing “yes” in Fig. 39 (c) invalidates all the jobs carried out in business editing and at the same time, this popup is closed and marker

editing is enabled. When “no” is chosen, the popup is closed but the screen does not change and the marker editing pathway (Fig. 21 (a)) state is held. And since in this event, the business editing job is kept registered in the machine, the newly chosen pathway, marker editing in the case of Fig. 39 (c) are not chosen. Consequently, even when trim is chosen in the marker editing again, only the Are you sure popup is opened and to return to business editing, the cancel button must be depressed on the Fig. 21 (a) screen.

The total surface/area popup is the popup automatically displayed when editing functions are chosen in creative editing, and intends to allow the user to choose whether the relevant editing function is set for the whole surface of the copy or for the area in the designated area. That is, in the creative editing, unlike marker editing and business editing, the specified editing function can be set in the area designated by the edit pad and at the same time, for the whole copy surface, the editing function can be set. Consequently, when the editing function is chosen in creative editing, first of all, whether the relevant editing function is provided for the whole surface of the copy or only for the designated area must be chosen. For example, when color conversion is chosen, the color conversion popup is opened and at the same time, in the relevant popup, as shown in Fig. 39 (d), the whole surface/area popup are automatically displayed. If the whole surface (Whole) is chosen in this event, the subject of color conversion becomes the whole copy surface, and when the area (Area) is chosen, color conversion is limited to the area designated by the edit pad. Incidentally, with respect to this parameter, for example, the whole can be designated as default, and if in

such event, the editing function is provided for the whole area, the whole area button is not depressed but other parameters are set and saving/closing is carried out. In such event, the whole surface/area popup is kept open, and the bit-map area and the area cancel button are not displayed. In addition, when the editing function is provided in the specified area only, the area button is depressed. Then, the whole surface/area popup is closed and as shown in Fig. 23 (g), the bit-map area and area cancel button is displayed and the area can be designated by the edit pad. However, the relevant whole surface/area popup is displayed only when the editing function which can be set for both the whole surface of the copy and the area is chosen, whereas the popup is not displayed when the editing function for which the area must be designated such as trim or mask, etc. is chosen.

(C) Rewriting for popup

Up to now, it has been described that other popup is not opened when one popup is open, but even when the popup is displayed, in case of emergency, when interruption with high priority is carried out, the specified screen must be rewritten and displayed on the popup so that the user can accurately recognize the situation. For the conditions, cases in which the start button is pressed, in which any fault occurs, in which the information button is pressed, and in which an interruption button is pressed can be mentioned.

In the event that the start button is pressed, even if popup is open, the run frame is rewritten as described above.

In the event that any fault occurs, the specified fault frame is rewritten on the popup. Because the fault is an emergency condition, the

fault frame must be displayed as a matter of high priority irrespective of presence or absence of popup display.

Since the information button is the button which is pressed when the user confirms the copier functions, operating method, etc., even when the popup is open, whenever the information button is pressed, the information frame must be displayed.

When the interruption button is pressed, the current job must be suspended and new job setting is carried out, and the basic feature pathway must be displayed. Consequently, even when the popup is open, when the interruption button is depressed, the basic feature pathway is rewritten.

(II-12) Message display system

As described above, according to the present UI, the user operation can be perfectly guided, and there is only an extremely small possibility that misoperation is carried out, but since the user does not always carry out correct operation only, by displaying some kind of message, the operating procedure must be introduced to the user or the user must be notified to the effect that the user made misoperation. Furthermore, message display is required in order to accurately tell the user the machine condition, in particular, abnormal condition such as fault, etc.

By the way, the message must be displayed in a predetermined area. Unless the message display position is standardized, it will confuse the user. In addition, the message which guides user operations (hereinafter called instruction messages) and the warning message which displays the machine condition or notifies misoperation (hereinafter called main message) must be displayed in different areas. That is, main messages could be short

sentences while instruction messages intend to guide operations and comparatively long sentences are required. On the other hand, a small-size CRT display is required to downsize the whole machine. Consequently, it is not advisable to set a large area in advance to display all the messages including instruction messages. In addition, the main messages must be constantly ready to be displayed, and the display position must be determined in advance and secured, but instruction messages may be displayed by popup as required only when complicated operations are required, and therefore, may be assigned to places not in use in the screen.

With the foregoing reasons, in the color CRT display, a main message area for displaying main messages and an instruction message area for displaying instruction messages are separately provided.

Incidentally, message blinking will not be carried out. Message becomes difficult to be read or burden is applied to creation of software, too.

(A) Main message

The main message is set to the area shown by A of Fig. 20 (a), that is, at the first to the third lines of the color CRT display, and in order for the user to easily understand the character of the message by the display position, the line to be displayed is set in accordance with the content of the message.

The first line is assigned to the machine status message, "You can copy", "Wait for a second", "Jammed", "Call serviceman", and other various machine status are displayed.

The second line is assigned to messages (hereinafter called "conflict messages") displayed when conflicting modes are chosen, when the

operations judged that the user in confusion, for example, when a button to open other popup is depressed with a popup open, or when the user carried out an operation assumed abnormal, and messages which are unable to be displayed in the second line only are displayed across the third line.

The third line is assigned to warning messages. These are minor warning messages and “Toner is short”, “Paper in tray 1 is short”, etc. are displayed.

Incidentally, the number of copies set can be displayed, for example, on the right end portion of the main message area. Assume that the size of the relevant number is same as the regular character size, the number of copies set conforms to the machine status; therefore, it should be displayed on the first line, but in the event that it is displayed in a large size of about double size of character in order to facilitate user confirmation, the first line and the second line should be used.

Because the display position is varied in accord with the kind of message as described above, similar messages are displayed on the same position, achieving user-friendliness.

Since the present UI uses a color CRT display, it is possible to facilitate user understanding by displaying messages in color. In such event, same as the display position, it is effective to distinguish messages by using different colors in accord with the type of messages. This is because the user can easily presume the content of message by the color of message. It is at the user’s discretion which color is assigned to which message, but for example, the following are possible.

General machine status message, for example, “You can copy”,

“Booting”, “Copying”, and other messages are messages indicating that the machine is in regular condition, and therefore, displayed in green which generally indicates “GO” state.

Pause status, for example, “Wait” and others are messages indicating that the machine is in the resting state and are displayed in amber.

The fault messages displayed in the case of jam, parts failure, etc. are displayed in amber, too.

The number of copies set is displayed in green pursuant to the above-mentioned general machine status message.

Service call messages are displayed in case of emergency and therefore displayed in red which is generally used in emergency situations.

Conventionally, in UI of personal computer, etc., red and green are primarily used for message display, but for the message display of the present UI, quiet colors are primarily used, and since it is quite rare to display reds, the copier is free of loudness.

Next discussion will be made on the priority of display. As described above, the main message area is limited to the three lines and one line is composed with 80 tiles. In the event that a plurality of messages must be displayed simultaneously, all the messages cannot be displayed simultaneously. Therefore, the priority must be decided as to which message should be given priority for display when simultaneous display requirements occur.

The priority of machine status message displayed on the first line is given as follows. The first priority is given to the failure display message,

followed by failure recovery message, and then, followed by general status message. The adequacy of this priority is apparent. This is because when any failure occurs, the failure must be cleared, and therefore, priority is given to failure display. "Jammed", etc. which is displayed when jamming occurs come under this and the relevant display is kept displayed without going to timeout until failure is cleared. Next priority is given to the failure recovery message, because the user must be notified to that effect when the machine is recovered from failure, and examples of the relevant messages include "Press the start button" displayed after jam clearing. The relevant message is kept displayed until the start button or all clear buttons is depressed.

In the event that there is no requirement to display the foregoing two messages, a regular machine status message is displayed.

The priority of messages to be displayed on the second and the third lines can be defined as follows.

[1] Message prompting disposition of failure

This message is displayed when the user can achieve the copyable status by carrying out a certain work, and for example, "Feed paper", "Feed toner", "Close the front door", "Call serviceman", "Completely insert the tray", "Sorter bin is full", and other messages are displayed. By the way, the relevant message is continuously displayed until the message content is satisfied.

[2] Function duplication message

This message is displayed when there is any contradiction between chosen modes, for example, automatic paper selection and automatic

magnification, and is kept displayed until function duplication is solved or a request to display a message with higher priority occurs. Examples of the relevant messages include “Incorrect directions of copy and paper”, “Auto magnification cannot be used in auto paper selection”, etc.

[3] Override message

This message is a feedback message to the user when the previous selection is changed to solve function duplication, and for example, when job is moved from marker editing pathway to business editing pathway, messages of “Business editing”, etc. are displayed, and when the diag. mode is entered, “Diag. mode” is displayed. In addition, when the interruption button is pressed, “Interruption” is displayed. Because the relevant override message is a feedback message for user selection, the message is timed out when the specified time elapses.

[4] Prohibition message

As described above, when popup is open, the button to open popup and the pathway button are invalidated. However, as far as the buttons are displayed on the screen, the user is likely to press the buttons, and it is the prohibition message prepared in such event, and for example, display such as “choose after closing popup”, etc. is performed. By the way, the relevant prohibition message is erased when there is a request to display messages of higher priority and by time-out.

[5] Warning message

This is a minor warning message as described above. Copy can be carried out and the message is given to call user’s attention.

[6] Run message

This is a message displayed when copying is started, and the number of copies set and the number of copies made, etc. are displayed. In the previous description, it was explained that the run frame is displayed when the start button is pressed to start copying, but the relevant run message is displayed when the above-mentioned run frame is not adopted. By the way, the run message is erased when copying is finished and when a request of display a message with higher priority is given.

[7] Blank message

This means that nothing is displayed. That is, when there is no message to be displayed, nothing is displayed.

(B) Instruction message

The instruction message intends to help the user operate the machine by indicating the operating procedure, and is displayed in an area at the lower left corner of the screen of editing pathway as shown in Fig. 21 (a) and Fig. 22 (a) as well as in an area at the lower left corner shown in A of Fig. 21 (b) in a popup screen, respectively.

By the way, it is recommendable that the instruction message displayed in the popup screen be interactive. That is, to take the coloring popup shown in Fig. 22 (b) for example, first of all, "Set the area, color, and kind of hatch" is displayed, and when the area is set, "Set the color and the kind of hatch" is displayed, and when the color is set, "Set the kind of hatch" is displayed to guide the operation. This enables even a user who is not skilled in editing to carry out operation with a feeling of security.